

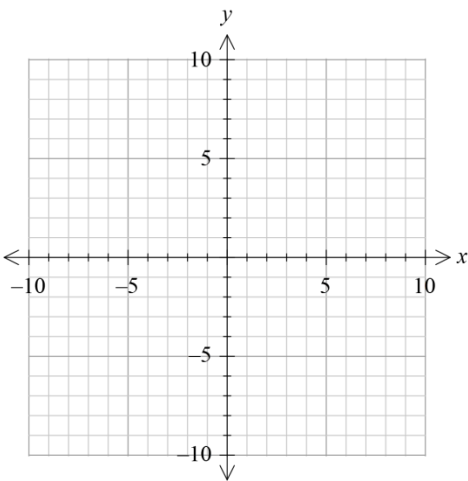
3.19 Vectors

Name _____ Date _____ Period _____

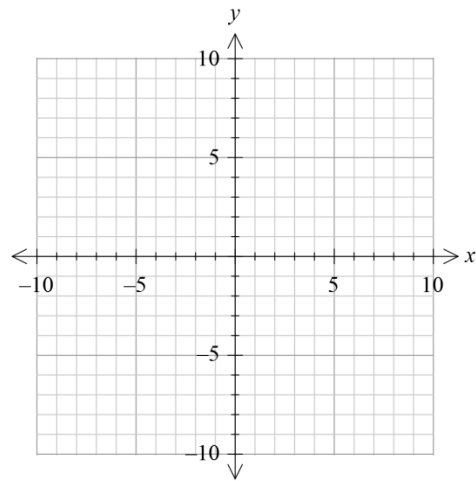
1. A _____ quantity involves both magnitude and direction.
2. Two vectors with the same magnitude and direction are _____ vectors.
3. The angle formed by the positive x-axis and a position vector is the _____ angle.
4. If the angle between two vectors is 90° , then the vectors are _____ or _____.

For each problem graph the given vectors **A** and **B**, then graph **A + B** and **A - B** on the same graph.

5. $A = \langle 1, 3 \rangle$ $B = \langle 4, 1 \rangle$



6. $A = \langle -2, 3 \rangle$ $B = \langle 4, 1 \rangle$



Find the magnitude of the horizontal and vertical components for each vector **v** with the given magnitude and given direction angle θ . Round to the nearest tenth.

7. $|v| = 4.5$, $\theta = 65.2^\circ$

8. $|v| = 8000$, $\theta = 155.1^\circ$

Find the exact magnitude and direction angle to the nearest tenth of a degree of each vector.

9. $\langle \sqrt{3}, 1 \rangle$

10. $\langle 8, -8\sqrt{3} \rangle$

11. $\langle 5, 0 \rangle$

12. $\langle -3, 2 \rangle$

Find the component form for each vector v with the given magnitude and direction angle θ . Give exact values using radicals when possible. Otherwise round to the nearest tenth.

13. $|v| = 8, \theta = 45^\circ$

14. $|v| = 12, \theta = 120^\circ$

15. $|v| = 18, \theta = 347^\circ$

16. $|v| = 3000, \theta = 209.1^\circ$

Let $r = \langle 3, -2 \rangle$, $s = \langle -1, 5 \rangle$, and $t = \langle 4, -6 \rangle$. Perform the operations indicated. Write the vector answers in the form $\langle a, b \rangle$.

17. $2r + 3t$

18. $r - (s + t)$

19. $s \cdot t$

20. $r \cdot s$

Find the smallest positive angle to the nearest tenth of a degree between each given pair of vectors.

21. $\langle 2, 1 \rangle, \langle 3, 5 \rangle$

22. $\langle -1, 5 \rangle, \langle 2, 7 \rangle$

Determine whether each pair of vectors is parallel, perpendicular, or neither.

23. $\langle -2, 3 \rangle, \langle 6, 4 \rangle$

24. $\langle 1, 7 \rangle, \langle -2, -14 \rangle$

25. $\langle 5, 3 \rangle, \langle 2, 5 \rangle$

Write each vector as a linear combination of the unit vectors \mathbf{i} and \mathbf{j} .

26. $\langle 2, 1 \rangle$

27. $\langle -7, -1 \rangle$

Given that $\mathbf{A} = \langle 3, 1 \rangle$ and $\mathbf{B} = \langle -2, 3 \rangle$, find the magnitude and direction angle for each of the following vectors. Give exact answers using radicals when possible. Otherwise round to the nearest tenth.

28. $-\mathbf{3A}$

29. $\mathbf{B} - \mathbf{A}$

30. An airplane with an airspeed of 520 mph is climbing at an angle of 30° from the horizontal. What are the magnitudes of the horizontal and vertical components of the speed vector? Round to the nearest tenth.

Review

31. State the three Pythagorean Identities.
32. The length of the hypotenuse of a right triangle is 66 feet and one of the acute angles is 33° . Find the other acute angle and the lengths of the legs.
33. Suppose α is an angle in standard position whose terminal side contains the point $(-3, 5)$. Find $\sin \alpha$, $\cos \alpha$, and $\tan \alpha$.